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PROJECT FINANCE

STRUCTURE OF PROJECT DEVELOPMENT FROM CONCEPT TO OPERATIONS

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STRUCTURE OF PROJECT DEVELOPMENT FROM CONCEPT TO OPERATIONS

by

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THESIS

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Master of Science in Engineering

The University of Texas at Austin

May, 2012

Dedication

This Thesis is dedicated to my daughter Aditi, who was born during the course of this program.

Abstract

PROJECT FINANCE

STRUCTURE OF PROJECT DEVELOPMENT FROM CONCEPT TO OPERATIONS

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The University of Texas at Austin, 2012

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With recent developments in the field of renewable power, it seems that we are ready to make a leap from wishing for a sustainable energy source to actually developing systems within the current political-economic framework to develop Solar Energy as a viable renewable energy source. In this thesis, I plan to study the path of development from concept to operations of a typical project financed solar power plant, applying knowledge and experience of Engineering-Management developed over the course of my professional career.

Project finance thrives on the ability of the Company to eliminate exposures to risks as much as possible. Risks associated with project finance exist in the implementation, construction and operational phase, with the various stakeholders liable for the various elements. In essence, the basis of project finance is management of risk and its assignment to appropriate stakeholder in order to avoid incurring liability, through contractual agreements.

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CHAPTER 1: PROJECT FINANCE

Modern Project Finance dates back to the development of the railroads in the United Stated from 1840 to 1870. In the 1930s, the technique was used to finance oil field exploration and later well drilling in Texas and Oklahoma. Funding was provided on the basis of the ability of producers to repay principal and interest through revenues from the sale of crude oil, often with long-term supply contracts serving as counter-guarantees. As a result, individuals and entities were able to venture into revenue-generating activities and projects without necessarily having sufficient collateral to guarantee the initial capital, and rely on the revenues generated from operations in the implemented projects. The impact of project finance in the actuation of national and regional policies through implementation of projects skewed toward enhancing the socio-economic aspects of the end-users has contributed to the expansion of the use of this financing model across the globe.

In 1970s, project finance spread to Europe for the development of the petroleum sector. It became the financing method used for extracting crude off the English coast. Also in the same decade, power production regulations were passed in the United States (PURPA – the Public Utility Regulatory Policy Act), thereby Congress promoted energy production from alternative sources and required utilities to buy all electric output from qualified producers (IPP's - Independent Power Producers). From that point on, project finance began to see even wider application in the construction of power plants for traditional as well as alternative or renewable sources.

The reliability of the aspects of the oil and energy sector in revenue generation accentuated the ability of such industries to attract project finance and thrive under it. From a historical perspective then, project finance came into use in well-defined sectors having two particular characteristics:

1. A captive market, created by means of long-term contracts at preset prices signed by big, financially solid buyers (off-takers)
2. A low level of technological risk in plant construction.

1.1 Introduction:

Project Finance is a method of raising long-term debt financing for major projects through 'financial engineering', based on lending against the cash flow generated by the project alone, it depends on the detailed evaluation of the project's construction, operating and revenue risks and their allocation between investors, lenders and other parties through contractual and other arrangements (Buljevich & Park 1999). Ultimately, the utilization of debt to finance projects based on projected cash flows and revenue-generating capabilities is what differentiates 'project finance' from 'financing projects'.

In essence 'project finance' is an approach to 'financing projects', or the manner in which funds for utilization in the implementation of projects are sourced and acquired. Large-scale public sector projects in developed countries are traditionally financed by Corporations by raising corporate loans (Delmon 2005). In developing countries, projects were financed by the government borrowings from the international banking market, multilateral institutions such as the World Bank, International Monetary Fund, Regional

Development banks, etc. or through export credits. However Sorge (2004) indicates that as privatization of public sector capital investment and deregulation of utilities caught on, they have changed the approach to financing investment in major projects, transferring a significant share of the financing burden to the private sector.

1.2 Characteristics of Project Finance:

- It is provided for a "ring-fenced" project i.e., one which is legally and economically self-contained through a special purpose legal entity (usually a company) whose only business is the project also called the 'Project Company'. As a result, strategic goals and objectives are achievable since the sole occupation of the Project Company is to ensure the inculcation of skill and diligence in utilization of the available finances to generate sufficient revenue. In addition to covering costs of operation and financing, the project company also seeks to gain returns from venturing into the project, hence the need for expertise.
- It is usually raised for a new project rather than an established business. Project finance is driven by specific objectives based on business ventures whose projected cash-flows and revenues are the sole measure of success.
- There is a high ratio of debt to equity – roughly speaking project finance debt could cover 70-90% of the cost of the project. The use of project finance is predominantly based on the fact that debt is cheaper in the long-run in addition to being easily accessible (Davis 2008).

- There are no guarantees from the investors in the Project Company or only limited guarantees for the project finance debt. The risky nature of the venture as well as other risk aspects associated with the cash-flow and revenue projections elevate the level of risk, making it impracticable for guarantees to be offered.
- Lenders rely on future projected cash flow to be generated by the project for interest and debt repayment (debt service), rather than the value of its assets or analysis of historical financial results. Since most project finance ventures are mainly novel projects, it is impossible to base projections on past performance.
- The main security for lenders is the project company's contracts, licenses or ownership of rights to natural resources, the projects physical assets are likely to be worth much less than the debt are sold off after default on the financing. As a result, it becomes necessary for due diligence and information search to be comprehensive in order to ensure that risks are mitigated.
- The project has a finite life, based on such factors as the length of the contracts or licenses or the reserves of natural resources, and therefore the project finance debt must be fully repaid by the end of this life. This fact requires that the due diligence analysis be performed, over the life of the project as a significant factor to the assurance of revenue forecasts.

These factors set apart project finance from other approaches to financing projects. The characteristics also provide the basic criteria for choice in the financing model based on the different facets of the project, offering the management of the project company a foundation for decision-making.

A Project Company, unlike a corporate borrower has no business record to serve as the basis for a lending decision. Nonetheless, lenders have to be confident that they will be repaid, especially taking account of the additional risk from the high level of debt inherent in a project finance transaction (Sorge 2004). This means that they need to have a high degree of confidence that the project (a) can be completed on time and on budget, (b) is technically capable of operating as designed, and (c) that there will be enough net cash flow from the project's operations to cover their debt service over the life of the project. Project economics also need to be robust enough to cover any temporary problems that may arise (Yescombe 2002).

Project Finance is made up of a number of building blocks, although all of these are not found in every project finance transaction, and there are likely to be ancillary contracts or agreements. The following diagram illustrates the building block of the project finance structure. Each of these components contributes to the overall outlook and nature of project finance.

The project finance itself has two elements:

- Equity, provided by investors in the project
- Project finance-based debt, provided by one or more group of lenders

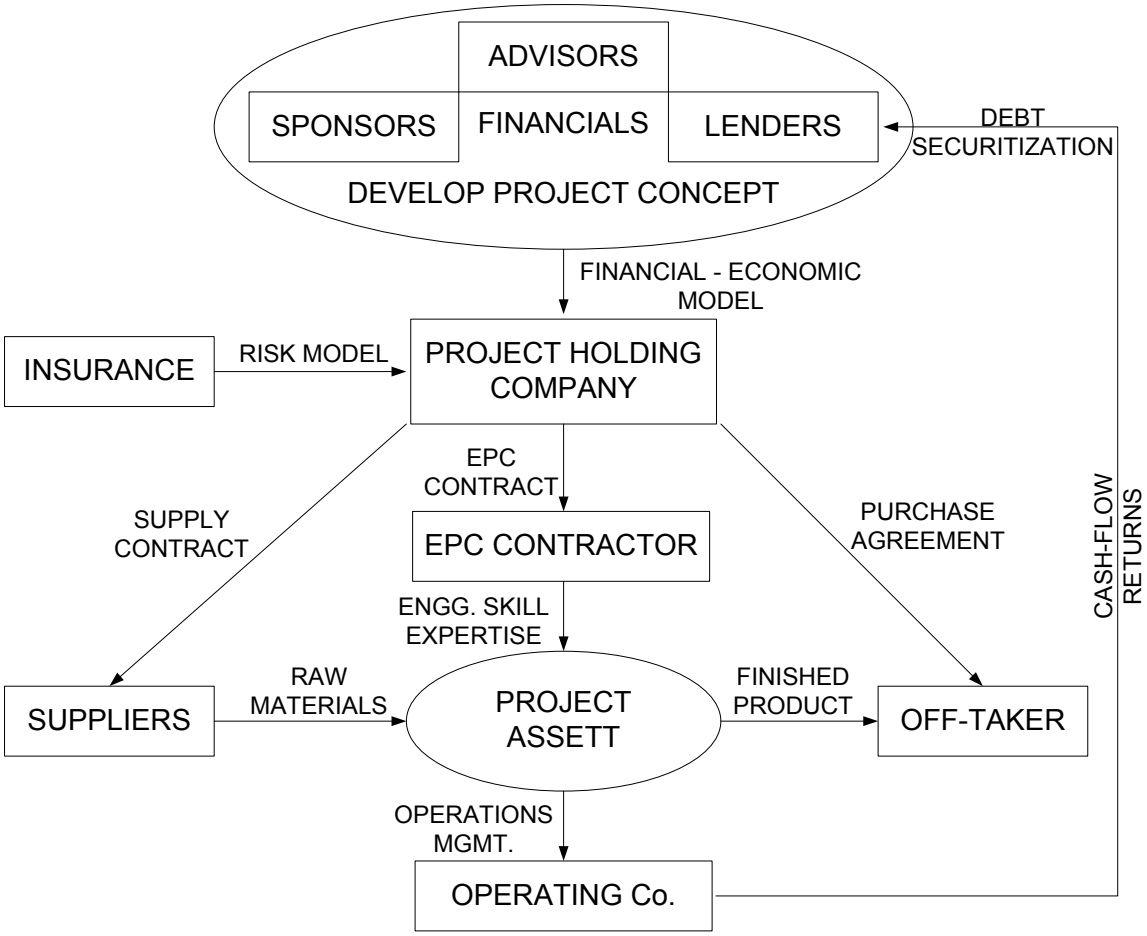


Figure 1: Project Finance Structure

According to Buljevich & Park (1999), the project finance debt has first call on the project's net operating cash flow, just like in any other financing arrangement involving debt financing. The fact that debt accrues a statutory obligation to the organization provides for this scenario. The equity investors' return is thus dependent on the success of the project. Once debt has been serviced, then debt can be handled. The contracts entered into by the Project Company provide support for the project finance, particularly by transferring risks from the Project Company to the other parties with Project Contracts, and form part of the lenders security package (Yescombe, 2002).

1.3 Ownership with Public Sector Projects

Project Agreements with the public sector, can take several different forms:

- Build-own-operate transfer (BOOT) projects: The Project Company constructs the project and owns and operates it for a set period of time, earning the revenue from the project in this period, at the end of which ownership is transferred to the public sector (Sorge 2004). Such projects are aimed at long-term development of economies in situations where due to lack of finances and expertise, the public mechanism of the country is not able to implement such projects. Once the project company recoups its investment and other revenue aspects, contractual obligations will come in to implement the transfer protocols in which ownership reverts to the public (Alfen et al 2009).
- Build-operate-transfer (BOT) projects: In this type of project, the Project Company never owns the assets used to provide the project service. However the Project Company constructs the project and has the right to earn revenues from the operation of the project. Under this arrangement, the management of the project is enhanced through the oversight of private sector with the public sector benefiting from ownership and the availability of service delivery systems.
- Build-transfer-operate (BTO) projects: These are similar to a BOT project, except that the public sector does not take over the ownership of the project until construction is complete.
- Build-own-operate (BOO) projects: These are projects whose ownership remains with the Project Company throughout its life – for example, a power station in a

privatized electricity industry or a mobile phone network. Project agreements with the private sector normally fall into this category.

The real value in a project financed in this way is not in the ownership of its assets, but in the right to receive cash flows from the project (Yescombe 2002).

1.4 Benefits to using Project Finance

A Project Company unlike a corporate borrower has no business record to serve as the basis for a lending decision. Nonetheless, lenders have to be confident that they will be repaid, especially taking account of the additional risk from the high level of debt inherent in the project finance transaction. This is a contributing factor to the nature of the industries in which project finance can be utilized, with preference lying in the less risky ventures (Pimentel et al 2007). This means that they need a high degree of confidence that the project (a) will be completed on time and within budget, (b) is technically capable of operating as designed, and (c) that there will be enough net cash flow from the project's operation to cover debt service. Project Economics also need to be robust enough to cover any temporary problems that may arise (Yescombe 2002).

As pointed out by Allen & Razavi (2006), the lenders evaluate the terms of the project contracts so as to provide a basis for its construction costs and operating cash flow and quantify the risks inherent in the project with particular care. They need to ensure that the project risks are allocated to appropriate parties other than the Project Company. This process is known as 'due-diligence'. The due-diligence

process may often cause slow and frustrating progress for the project developer, as lender inevitably tend to get involved in the negotiation of project contracts. Besides being slow and complex, and leading to some loss of control of the project, the project finance is also an expensive method of financing. The lenders margin over cost of funds may be 2-3 times that of corporate finance; the lenders due diligence and control process and the advisors employed for this purpose also significantly add costs.

Despite these factors investors choose project finance for a variety of reasons:

- **High Leverage:** One major reason for using project finance is that investments in ventures such as power generation or road building have to be long term but do not offer an inherently high return: high leverage improves the ROI for an investor. The higher the ROI, the higher the benefits to the rational investor.

  According to Pimentel et al, (2007), project finance thus takes advantage of the fact that debt is cheaper than equity, because lenders are willing to accept a lower return (for a lower risk) than an equity investor. Naturally the investor needs to be sure that the investment in the project is not jeopardized by loading it with debt and therefore has to go through sound due diligence process to ensure that the financial structure is prudent. Similarly, in spite of the high risk associated with these ventures, the existence of contracts and agreements with public sector institutions implies that there is a ready market

in a low-competition environment, thereby transferring the responsibility of success to the aspects of management (Fight 2006).

- **Tax Benefits:** According to Dewar (2011), an additional factor that may make high leverage more attractive is that interest is tax deductible, whereas dividends to shareholders are not, which make debt even cheaper than equity, and thus encourages high leverage. Tax benefits associated with debt finance have in most instances contributed to the introduction of elements of leverage in the organization, even for ventures where equity finance is best suited.
- **Off-Balance-sheet Financing:** If the investor has to raise the debt and then inject it into the project, this will clearly appeal on the investors' balance-sheet, (Allen & Razavi 2006). A project finance structure may allow the investor to keep the debt off the consolidated balance sheet, but only if the investor is a minority shareholder in the project – which may be achieved if the project is owned through a joint venture. Keeping debt off the balance sheet is sometimes seen as beneficial to a company's position in financial markets. Off-balance sheet financing elevates the attractiveness of an organization, thereby enhancing the ability of the entity to attract and retain various sources of finances without inflating the required rates of return as observed by Pimentel et al, (2007).
- **Borrowing capacity:** Project finance increases the level of debt that can be borrowed against a project. It may thus increase an investors overall

borrowing capacity and hence the ability to undertake several major projects simultaneously.

- **Risk Limitation:** An investor in project raising funds through project finance does not normally guarantee the repayment of the debt – the risk is therefore limited to the amount of the equity investment, as observed by Dewar (2011). A company's credit rating is also less likely to be downgraded if its risk on project investments is limited through a project finance structure. As a result, investors can limit their exposure to risk on the basis of assured returns, with the possibility of increasing their investment when the project proves successful.
- **Risk Spreading / Joint ventures:** A project may be too large for one investor to undertake, so others may be brought in to share the risk in a joint-venture project company. Joint-ventures contribute to the reduction of risk through spreading it among an array of financiers, most of who introduce an element of expertise and experience, thereby enhancing the ability of the project to succeed, (Fight 2005). This enables the risk to be spread between investors and limits the amount of each investor's risk because of the nonrecourse nature of the Project Company's debt financing. Joint-ventures are also better at managing variations and fluctuations in cash-flows and cost estimates, making it possible for support systems for contingencies to be implemented more efficiently as compared to sole ventures.

- **Long-term Finance:** Project finance loans typically have a longer term than corporate finance (Fight 2005). Long-term financing is necessary if the assets financed normally have a high capital cost that cannot be recovered over a short term without pushing up the cost that must be charged for the project's end product. Similarly, the long-term financing aspects of this type of finance provides for uncertainties in revenue-generation and other factors in the project life cycle. Ultimately, in the long-run, all variables become constant, making it possible for returns to be accorded to the various investors.
- **Enhanced Credit:** If the off-taker has a better credit standing than the equity investor, this may enable debt to be raised for the project on better terms than the investor would be able to obtain from a corporate loan. Due to the double coincidence of wants, off-takers and investors find it necessary to work hand in hand to promote the success of the project, since revenue-generation and maximization of cash-flows is their common goal. Cooperation among the investors and off-takers is clearly outlined in the agreement drafts, in which case each individual plays a role in the success of the organization with returns accruing commensurate to the level of output.

1.5 Project Finance Markets

Finnerty (2011) contended that the source of finances for project finance is closely linked to the outcome of the venture. It is usually preferable and convenient for project in a particular country to raise its finance from banks operating in that country,

first because they have the best understanding of local conditions, and second because the funding can be provided in the currency of the country, so avoiding foreign exchange risks. Thus in developed countries projects are normally financed by local banks or foreign banks with branch or subsidiary operations in the country concerned. Such financing constitutes the largest proportions of the project finance market (Fight 2006).

In some developing countries, however this approach may not be possible. There is no market for long-term loans in the domestic banking market, or the domestic banks may have no experience in project finance. In some developing countries (such as India and Brazil), there are public sector local development banks that can help to fill the gap if the local commercial banks are not able to provide the funding needed.

International banking market also plays a major role in project finance for developing countries. However, the social, cultural, political and economic aspects of the developing country play a major role in the willingness of these international banking institutions to enter into such agreements with ventures in developing countries. A developing nation with a weak financial system elevates the level of uncertainty introducing heavy risk premiums, most of which are considered unworthy.

Project can raise finance through a Bond issue by a Project Company, basically similar to a loan from the borrower's point of view, but it is aimed mainly at the non-banking market and takes the form of a tradable debt instrument. The issuer (i.e the Project Company) agrees to repay to the bond holder the amount of the bond plus interest on the fixed future installment dates. Buyers of project finance bonds are investors who require good long term fixed rate return without taking equity risk, in particular insurance

companies and pension funds. Bonds and other tradable and negotiable instruments are preferred by investors as forms of debt/ ownership due to the fact that they can be liquidated through transfer at will. In addition, the fixed rate of return enhances eliminates certain forms of risks.

According to Alfen et al (2009) public sector debt is sometimes provided to projects as a kind of subsidy. Public sector grants may be provided to the Project Company – these may be without the obligation for repayment, or may be repaid if the project reaches an agreed level of success. Where there is no obligation for repayment or repayment is contingent in nature, such grants are considered as equity rather than debt. The basis for such subsidies is the fact that these projects are aimed at enhancing the living standards of an economy in the future as well as providing necessary public infrastructure. By working in conjunction with the private sector on such projects, the public sector manages to achieve efficiency and effectiveness in developing basic infrastructure for the production of goods and services.

Thus it is efficient to fund public infrastructure with private sector money using project finance since the private sector is more efficient managing the construction and whole-life maintenance of project (Finnerty 2011), which therefore produces a lower cost for private-sector funded projects, despite the fact that the private sector debt raised for such projects costs more than public-sector funding. The efficiencies of private sector management are ultimately capable of surpassing the implied and actual costs of using costly finances, thereby stimulating growth and development in an economy.

CHAPTER 2: PROJECT ECONOMIC AND FINANCIAL INDICATORS

To check whether a project finance formula can be applied for a given initiative, project advisors build a financial model. The technical/industrial, legal and insurance considerations are complied, collated and translated into numbers. Some are obtained from objective data and others are computed within the framework of a precise set of assumptions. The advisor's aim is to come up with estimates on cash flows, profit and loss and the balance sheet along with a series of ratios based on the same forecasts. The projected cash flow calculation is vital for valuing the ability of the initiative to generate enough cash to cover the debt service and pay sponsors dividends that are in line with expected returns. The utilization of project finance necessitates close monitoring of project progress, cost and revenue levels as well as changes in the environmental factors that may influence the outcome of operations.

2.1 Cash Flow Analysis

Cash flow analysis forms a fundamental component of project finance and determination of the viability of project even in other forms of finance. Reliability of cash flows in indicating the feasibility of projects originates from the fact that the various cash flow measures (including before and after tax cash flow measure as well as incremental cash flows) point towards the real movement of cash in the entity. Cash flows analysis culminates in the classification of the elements in operating, financing or investing cash flows (Short, Paxckey & Holt 1995).

According to Tham & Vélez-Pareja (2004), cash flows from operating activities comprise of all revenues accrued, less costs and expenses associated with operation and maintenance. While, cash flows from financing maps all cash originating and going into sourcing of financing debt-service for repayment of loans and dividends to shareholders. The specific form of analysis will determine how the cash flow base is to be utilized, with the outcome providing important insights to the investors and project sponsors. Consequently, cash flow analysis provides the basis for taking into account the timing and magnitude of costs and gains from the activities involved in the implementation and operation of the project. Accuracy in revelation of the requirements and status of the project is a primary role of all stakeholders, with the cash flow analysis providing the most reliable source of information.

2.1.1 INFLATION

Changes in prices over time reduce the real value of currency (Newell 2008). These changes are sometimes unpredictable, hence the need to perform post-expenditure analysis in order to cater for the changes. Inflation erodes the value of a dollar, thereby introducing the idea of real value and nominal value (current value and constant value). The actual cash flows to be utilized in the project plans are in the 'current value', with most plans spotting the constant dollar value, based on a specific base year.

Transformation of current dollar values can be expressed in the constant dollar value by projecting them to the indexed value, with the timing of the plans being measured against a base year. This adjustment referred to inflation adjustment index is normally measured against certain indices such as Gross Domestic Product (GDP).

Consumer price indices (CPI) measure the mean changes in the prices in as assortment of goods and services in an industry, with the application in the national scale providing real inflation rate to be applied across economic measures.

2.1.2 DEPRECIATION

According to Short, Paxckey & Holt (1995), the time value of money is also reflected in some forms of investment, with the passage of time resulting to change in value of the assets. The recognition of income is impaired incase the level of depreciation is not taken into consideration. Depreciation is the cost of generation of income from an asset, taking into consideration the wear and tear, depletion and changes in value due to usage. Various depreciation models are used when calculating the value of depreciation. First, the Modified Accelerated Cost Recovery System (MARCS) is a federal approach to measurement of tax where the level of depreciation is done using the General Depreciation System (GDS) and Alternative Depreciation Systems (ADS). More subtle methods of estimating the depreciation include the straight line method (SL method) and the fixed charge methods are used.

Recommended values for GDS and ADS for major plants are indicated in the following figure:

- Alternative energy property (nonutility generators) - 5 years
- Alternative energy property (public utility generators) - 7 years
- Nuclear production plant - 15 years
- Nuclear fuel assemblies - 5 years
- Hydro production plant - 20 years
- Steam production plant - 20 years
- Combustion turbine production plant - 15 years
- Transmission and distribution plant - 20 years
- Nonresidential real property - 31.5 years.

Recommended recovery periods using ADS methods include:

- Alternative energy property (nonutility generators) - 12 years
- Nuclear production plant - 20 years
- Nuclear fuel assemblies - 5 years
- Hydro production plant - 50 years
- Steam production plant - 28 years
- Combustion turbine production plant - 20 years
- Transmission and distribution plant - 20 years
- Nonresidential real property - 40 years.

Source: Short, Paxckey & Holt (1995).

Depreciation is not always resultant to lose of value, since some assets gain value (appreciate) over time. For example, real estate appreciates over time, thereby necessitating revaluation over time. In instances where depreciation is not a reliable measure, revaluation can be employed through the use of standard and custom designed standards to measure the true and accounting value of an asset.

2.1.3 TAXES

Taxation is a source of additional cost to the capital and other aspect of the project. In addition, tax could also incur costs in the cost of factors of production such as labor and materials, thereby enhancing the level of costs. Inclusion of relevant tasks

provides accuracy in the analysis of financial aspects, with accurate exposition of the associated costs including taxes (Hoffman 2008). Cash flow analysis should be analyzed based on the after-tax values of the specific cash flows in order to enhance their reliability and accuracy as well. Tax has a major impact on the estimation of various provisions such as depreciation and bad debts especially for project elements with various cost and revenue characteristics.

Depending on the real situations, taxes are intrinsic costs to private entities having a huge impact on the profitability of a project. However, from a societal point of view, taxes implies transfer payments with the effect of correcting certain externalities for the benefit of society in the long run. Taxes are major components of the estimation of WACC, cash flows and indirect effects are also posted in the inflation estimations in the analysis of cash flows (Short, Paxckey & Holt 1995).

Taxes are not always determinants of costs, but can also offers a chance for generation of revenues and financing, such as tax credit for renewable energy. Such credits are aimed at investments in certain sectors, especially where private-public partnerships exist. The government uses this avenue to enhance the level of investment in certain sectors, thereby presenting it as a form of subsidy depending on the efficiency in achievement of specific factors.

2.1.4 WEIGHTED AVERAGE COST OF CAPITAL-WACC

The weighted average cost of capital is a measure of the total cost of capital to an organization, taking into account the fact that the capital structure of the company is comprised of varied types of capital including debt and equity. Calculation of the WACC entails proportionate measurement of the costs of capital of each element measured against its proportion in the total capital structure of the company, thereby making it possible to assign the accurate costs. By using the capitalization ratio, the specific costs associated with every form of capital are into consideration.

First, the cost of each component of capital is estimated through the normal process, with the capitalization ratio being sourced from the quotient of each source of capital measured against total capital. Normally, the weighted cost of capital estimated by:

$$WACC = r_{cc}[C_e \div (C_e + P_s + D)] + r_{ep}[P_s \div (C_e + P_s + D)] + (1 - T)r_d[D \div (C_e + P_s + D)]$$

Where:

r_{cc} = rate of return on common equity
C_e = common stock and corporate retained earnings (Weston and Brigham 1981)
P_s = preferred stock
D = debt issues
r_{ep} = rate of return on preferred stock
T = corporate tax rate[8]
r_d = interest rate paid on debt.

Source: Short, Paxckey & Holt (1995).

2.2 The Economic Indicators

2.2.1 Net Present Value (NPV)

The NPV for a project is the difference between costs (cash outflows) and revenues (cash inflows) discounted over the project life. The NPV is one approach towards selection of projects, based on the identification of projects which result to returns by measuring the project costs to the discounted revenues and cash flows. Positive NPV indicate that the project will be profitable and will guarantee debt service and returns to shareholder, while a negative NPV indicate that costs will outrun the revenues in the process of the project. NPV can also be used to rank projects according to viability, with projects sporting high NPV being the most viable. As an adjusted discounting method, this process enables organizations to utilize the desired discounting depending on the risk aspects of the company and project, thereby resulting to successful outcome of the investment process.

2.2.2 Total life-cycle cost-TLCC

TLCC is applicable in estimation of the variances in the costs and timing of expenditure between two projects. Cost expensing is an important aspect of financing since the time value of money is a factor in the timing and value of expenditure. However, this process does not provide sufficient basis for selection of projects since it does not classify projects on the returns and benefits. However, it is a major component in cost assessment and identification of most influential costs in the project life cycle.

2.2.3 Revenue requirements

Revenue requirements offer a complementary decision making analysis to the TLCC, owing to the fact it generates information regarding the revenue aspects of projects. In essence, the RR is the total revenue required from users of the products from the project in order to ensure that costs, direct and indirect as well as margins for financing are covered. As a result, this information can be used in stipulating pricing and unit costs, in order to enable decision makers to determine the viability of the project. Used in conjunction with other project, the RR ensures that the consumers can actually manage to support the revenue requirements and can afford the project in the end.

2.2.4 Levelized Cost Of Energy-LCOE

The levelized cost of energy is an estimation of the cost of production of unit of energy from the various source of energy in order to determine the most viable source of energy to invest in. Production costs is the most influential factor on the energy pricing for the project, as a result, since there are numerous options including nuclear and fossil energy sources, this element enables the decision makers to determine if the outcome of the investment will be affordable enough to the end consumer based on their total energy portfolio, as well as whether the project category is the most economic.

2.2.5 The Internal Rate of Return-IRR

The IRR is the rate of return to investment which discounts the returns to a level equal to the costs, and a subsequent zero value for NPV. As a result, this method provides the basis for calculating the rate of returns which will result to the positive outcome, and is used to provide information for acceptance or rejection of projects.

CHAPTER 3: PROJECT RISK MANAGEMENT THROUGH CONTRACTS

As indicated by Alfen et al (2009) risk aspects of project finance are primary concerns of all stakeholders, including the investors and financiers. Risk is the product of variations in the anticipated outcome. Uncertainties associated with the future influence the ability of management teams to achieve strategic goals, and rarely are expectations exceeded. As a result, the inability to achieve targets and other operational standards adversely affects an organization, making it necessary for sufficient provisions to be made regarding the possible risk elements.

In any venture, risk aspects can be classified under certain categories in order to ease their management. Related risk elements are normally classified together, thereby according organizations the ability to handle them more efficiently. The risk model for project finance comprises of project risks, financial risks as well as investment risks among others.

3.1 Project Agreement Contracts

3.1.1 OFF-TAKE CONTRACT

According to Allen & Razavi (2006), off-take agreements are made between off-takers and the project company. Off-takers are parties or entities that purchase the products originating from the project. Ultimately, this agreement lays down the basis for volumes of production or deliveries, which influence the price of the agreement. Such agreements are a necessary element of the ability of the organization to possess a stable and reliable source of revenue for the fulfillment of obligations to investors and

financiers. Sufficiency of revenues from the off-taker is a major factor in the implementation of the project, thereby necessitating the drafting of contractual obligations for the production and delivery of these goods and services. Under such contracts, the off-takes is the sole purchaser of the goods and services produced, thereby making it impossible for operations to take root in the absence of such a contract.

Pretorius et al (2008) is of the view that the most common forms of off-take contracts include take-or-pay contracts, take-and-pay contracts, long-term sale contracts, hedging contracts, contract for difference, throughput contract, as well as power purchase agreement. Take-or-pay contracts bind the off-taker, who is also the sole purchaser of the goods and services being produced, to pay for a certain proportion of the production. This contract binds the off-taker to pay the project company regardless of whether they consume the products or not, since the project company has already incurred expenses during the production process. On the contrary, take-and-pay contracts bind the off-taker for purchase and payment of goods or services consumer. Compensation is only accrued for goods actually consumed. As a result, the project company has the duty of ensuring that they match production with demand, and stimulate demand for the products. For these contracts, the purchase price is normally fixed at the start of the agreement.

According to Vinter & Price (2006), with regard to long-term sales contracts, the agreement provides for the purchase of certain quantities of the goods/services, but at the going market rates, or at a tentative premium, subject to a minimum price. Contracts for differences are similar only that the off-taker agrees to compensate the project company for the differences in the anticipated price and actual market price in order to enable the

company to recoup its costs. In some instances, the vice-versa is also applicable, with excesses flowing to the off-taker.

Thorough-put contracts entail the utilization of pipelines for a specific volume of products at a minimum price. These forms of contracts are also referred to as transportation contracts, the users have to utilize the service up to a certain contract, as indicated by Yescombe (2002).

Allen & Razavi (2006) postulated that power purchase agreements are structured for independent power producers. Under such agreements, the off-taker, mostly a government/public sector entity agrees to purchase power from the producer of the energy forms, at certain prices and for a specific period of time. Power purchase agreements have been utilized in the enhancement of usage of solar energy. Public utilities enter into power purchase agreements with households which use this form of energy in order to purchase all or part of the energy produced and channeled to the national grid. Guidelines on the manner in which power is produced and management of the plants are clearly indicated in the agreement, with accurate information on the ability of the company to possess the necessary financial and technical capacity to assemble and run such a plant.

3.1.2 CONCESSION AGREEMENT

Concession deeds, also referred to as concession agreements, are agreements made between contracting authorities (mostly public sector entities) and the project company. The contents of the deed form the basis for concession of assets owned by the government through the public-sector entity, to the project company (Pretorius et al

2008). Terms and conditions contained in the deed range from extent of usage of the asset as well as the duration of the agreement.

Most projects associated with infrastructure are accompanied with such deeds, with the contracting authority being a municipality or the regional government. Special purpose entities set up by governments may also be granted the powers to enter into concessions with private sector and other project companies. Examples of concessions include agreements for collection of tolls from transport systems or tunnels, revenues from transport systems as well as other public sector amenities such as healthcare centers and learning institutions.

3.1.3 EPC CONTRACT

Turnkey contracts, also referred to as EPC contracts (Engineering, Procurement and Construction), are agreement in which the special purpose vehicle (SPV) relinquishes risks associated with construction to the contractor for a specified fee. Under such conditions, the project company utilizes the experience and expertise of the construction contractor to provide the elements related to engineering, procurement and construction, and matches the outcome of construction to the owners' requirements. The 'turnkey' reference implies the fact that the owner (Project Company) will find everything ready for occupation and production of the expected products.

Key provisions under this kind of contract include the following:

- Scope and Responsibilities of the Contractor: The construction contractor has all-inclusive responsibilities, thereby ensuring that all actions are geared towards presentation of a complete project commensurate with the expectations of the

project company. Project designs vary depending on the technical and intrinsic nature of the specifications of the contract, thereby making it important for instructions and contents of the agreements to the latter. The culmination of the project is normally achieved once an appraisal by an independent engineer or expert approves and confirms the achievement of the expected milestones (Vinter & Price 2006).

- Compliance with existing Laws and Regulatory Standards: Construction contractors are bound to abide by and apply all the permitted standards. The existing standards influence the choices of the project company as well as the contractor, thereby making it the responsibility of the project company to inculcate such guidelines in the agreement in order to relinquish liability to the contractor.
- Project Management: A designated project and site manager is normally part of the agreement. Such individuals are the go-betweens between the Project Company and contractor, thereby providing for easy flow of information to ensure accurate implementation of the project. The designation of such individuals is normally done under authority from the project company; hence reassignment of the responsibilities without the consent of the buyer is normally disallowed. Similarly, removal of such individuals can only be done under the sanction of the owner of the project.
- Third-party relationships and cooperation: The completion of infrastructure projects entails the input of numerous stakeholders, including sub-contractors and

other professionals. This cooperation is critical to the outcome of project, with the input of other individuals contributing to the timely and successful implementation of the project.

- Safety: The construction process is laced with numerous uncertainties, making it important for the usage of new and reliable equipment and materials. Presence of warranties of quality makes it possible for guarantees in safety at the work place, with other forms of permits acquired. Ultimately, the presence of comprehensive and suitable insurance coverage for traumatic occurrences eliminates the risk aspects of the project. Sufficient training and educative efforts should also be outlined in order to ensure that the utilization of the novel machines and equipment does not contribute to adverse outcomes.
- Schedule and Progress Reports: Construction projects are time-bound, thereby necessitating timely and frequent reports and updates on the progress of the project. Such regular progress reports provide the basis for release of funds as well as provision of resources for completion to the next phase (Allen & Razavi 2006). Progress reports provide a basis for decision-making since they indicate the earliest time of completion as well as address the reason for any delays. Progress reports are also utilized in determining the percentage of completion of the project.
- Graphic renderings for the project specifications: Generally, contractors have to develop renderings for the project through plans aimed at offering a visualization of the completed project. Such rendering, whether in 2D or 3D offer the owner of

the project a visual and scale image of the outcome of the construction process, aiding in decision-making. Such rendering also supplements the progress reports, with the culmination of the project resulting to identical real-life image of the renderings.

- Training of the concerned workforce: The importance of training to the completion of the project cannot be over-emphasized. In spite of the fact that the contractor is responsible for the outcome of the project, it is important for the project company to ensure that those responsible for operation of the machines are well-versed with the basic and specific instructions, in order to avoid invalidation of the warranties and guarantees. As a result, training programs are also efforts aimed at ensuring timely completion since accidents and other related incidences are bound to destabilize progress in the long-run. Success of these projects is thus reliant on cooperation between the two parties in ensuring that the staff and other individuals are knowledgeable of their responsibilities.

3.1.4 O&M CONTRACT

Operations and Maintenance (O&M) contracts are characterized by the establishment of an agreement between a qualified site manager and the owner of the project, Alfen et al (2009). The responsibilities of the site operator include performance of operational norms, maintenance and refurbishment of the project. Relinquishment of such responsibilities forms the basis of risk mitigation, with the relevant risk falling under the liability of the knowledgeable and conscientious individuals. Such activities are carried out by experienced personnel; in order ensure all operating practices are kept in

place. Provisions of such contracts relinquish operational risks to the operator while fluctuations in the productivity of the project are not part of his liability. Occurrences outside his responsibilities and control are capable of affecting the availability of supply.

According to Yescombe (2002), O&M contracts are sometimes handled by sole contractors while sometimes the responsibilities are split between multiple contractors due to the variations in the expertise requirements. This scenario can also present itself in the form of various contracts, such as engagement of EPC contractors for long-term development and maintenance while the O&M contractors handle the basic and general operations. The operator's obligations are dependent on the nature of the project as well as the extent to which the project company takes responsibility for the company. However, generally, they are limited to:

- Provision of necessary personnel and individuals to man the service provision requirements with regards to operations, maintenance and repairs to the project
- Ensuring compliance of the current project with government and industry norms and requirements, as underlined by 'prudent industry norms'
- Performing necessary actions and duties, as a proxy to the project company, in order to maintain the operational status of the project, actions which are considered reasonable and necessary
- Performance of procurement and maintenance of supply contracts

This form of contracts normally accord obligations on the part of the contractor on the forbearance of certain performance standards as well as risk aspects, mostly with regard to operational risk (Enthoven, et al 2010). In addition, price estimates contained

therein are based on paradigms that allow for proper running and maintenance of the facility. The price structures could either be fixed price, cost plus or percentage of cash-flows. Fixed-price contracts have prices outlined forth-right in definite terms, mostly appropriate under circumstances where the parties are related corporate-wise. Time value of money and inflation risk aspects are the main causes of an inflated budget under fixed price contracts, making them costlier than others (Weber & Alfen 2010). Cost-plus structures rely on reimbursement of incurred costs laced with a profit element, in which case the owners of the project bear the risk of unexpected fluctuations in prices. Under percentage of cash-flow terms, ultimate compensation to the contractor is pegged on the output of the completed facility as well as the costs of operating the project. Bonuses and penalties are used in order to stimulate optimal productivity, with the sole aim of achieving operating budgets for each period.

O&M contractors normally provide the site managers and senior level supervisors, while the project company avails other employees, thereby making it possible for adherence to project guidelines and standards as observed by Yescombe (2002). Owing to the level of experience and expertise of the O&M contractors, they sometimes provide smooth handover procedures and mobilize support for the transition from EPC contractors once the project has been completed. Owing to their ability to run and manage such projects, they provide information and useful insights on how to convert the cost heads to revenue generating elements of the organization.

In addition to ensuring a smooth transition, O&M contractors play a role in obtaining operating and contractual permits; elevating the operational capacity of the

project to industry standards; development of annual and periodic budgets; ordering, handling and maintenance of inventories for supplies and other requirements; maintaining operating costs and other overheads within the stipulated budgetary levels; establishment and maintenance of health and safety standards; filling of the necessary records and ensuring that operating manuals are up to date as well as maintenance of quality through periodic repairs to components of the project.

3.1.5 INPUT SUPPLY CONTRACT

Project companies as well as the contractors require various forms of inputs from specific suppliers in order for the completion of the project to be achieved. Such inputs form an imperative aspect of the progress of the project, making it necessary for timely delivery of such inputs to be assured. As a result, by entering into input supply contracts, the supplier(s) of the inputs are assured of a ready market and destination for the product, while the contractor/project company is assured of a ready supply of necessary raw materials (Weber & Alfen 2010). The guidelines of the input supply contracts entail agreements regarding the quality and quantity of the inputs as well as the timings of supply in order to ensure timely completion. As a result, the supplier does not shy away from acquisition of such materials since he has a clear and assured destination.

Input supply contracts are mainly relied upon with regard to acquisition of specialized equipment, and could exist between the producers of such inputs and the project finance. Owing to the scale of inputs, the supplier would not on normal operational conditions produce such levels, with the variations in production done in order to fulfill the requirements of the contract.

3.1.6 PERMITS AND OTHER RIGHTS

Project permits differ from one country to the other. Similarly, Enthoven, et al (2010) highlighted that different projects have different permits, thereby implying that permits are strategic imperatives for public sector companies. Projects in conjunction with governments, such as concessionaries and government support agreements are laced with certain aspects of permits or assurances of support in acquisition of such permits. The number of permits is sometimes related to the size of the project, with such projects forming a significant proportion of the preparations before implementation of the project. Acquisition of certain projects may necessitate legal advice or advisors, thereby introducing the need for lawyers and other experts.

The first stage in the construction process entails the acquisition of Environmental Impact Assessment (EIA). These are permits indicating that the project does not in any way affect the environment adversely. Elements of such a permit entail indications that the project has been analyzed with regard to its impact on the surrounding habitats and ecosystems; its impact of historical aspects of the surrounding environment, aspects of noise and dust pollution as well as construction traffic; the level of emission and abstractions in relation to water and other atmospheric impurities; waste disposal procedures; long-term effects such as impact on social amenities, infrastructure, as well as to the society and the natural ecological niches.

As indicated by Yescombe (2002) following this assessment, which at minimum must clearly demonstrate that the project complies with legal requirements on such environmental issues, an environmental clearance may be obtained. Even if this process

is not a legal requirement, many lenders, both in the private and bilateral or multilateral sectors, may require an EIA as a condition of providing funding.

Construction permits exist in numerous forms and kinds. Owing to the nature of project finance, responsibility for acquisition of such permits lies squarely with the EPC contractor, since that is the area of his expertise. Risks associated with delays or failure in acquisition of such permits are squarely borne by the EPC contractor, as a result, the contractor ought to prepare the necessary paperwork and ensure that requisition for such permits is done in collaboration with the project company. Owing to the fact construction work necessitates the acquisition of new and specialized equipment, construction permits are sometimes acquired for importation of such implements.

Finally, operating permits are the crux of the completion of the project, providing the basis for operation. In most cases, these permits are the last in line of permits to be acquired. Operating permits vary depending on the industry in which the project company operates in as well as the kind of products on offer. Such permits are also sometimes required for the importation of certain raw materials or inputs, which can only be a viable operation if the project is complete, as postulated by Weber & Alfen (2010). Hoffman (2008) proposed that, qualification standards before acquisition of such projects calls for achievement of active production in order for assessment to be done before the permit can be granted, such as emission permits and noise levels. As a result, it becomes necessary for the necessary kinds of permits to be acquired at the earliest opportunity in order to avoid delays in the completion or funding for the project.

3.2 Insurance and Risk Management through Contracts

According to AlHawari (n.d.), "most projects or business ventures take place in a changeable environment in which many drawbacks exist that may negatively impact the outcome of project success". Success of the project is hinged on the dimensions considered important by the various stakeholders as discussed in the following chapter. Most stakeholder groups place high emphasis on security of the investment, efficiency and effectiveness in cost-reduction and revenue generation, viability of the project, sustainability of resource utilization, ability to integrate with other related systems as well as functional aspects of the project.

According to Taylor (2009) project companies and other stakeholders in the implementation of the project normally rely on insurance in order to mitigate the risks associated with the future. Risk mitigation efforts through insurance are the most common factor across projects, making it necessary for all parties to the completion of the project to be knowledgeable regarding the available opportunities and constraints in order to make accurate and reliable decisions. Insurance entails the transfer of responsibility to a specific entity (the insurer) for a specific agreed consideration, in order to facilitate restitution incase the insured event occurs.

All risk insurance entails protection against factors that can influence the timely completion of the project; up to the time that performance testing is carried out following successful completion of the project as indicated on appendix 1. The project company is assured of restitution incase 'Acts of God' as well as other standard perils occur, thereby representing a scenario of comprehensive insurance. Other aspects of insurance relate to

third parties, costs and profit levels as well as miscellaneous coverage which provides for unanticipated occurrences. Miscellaneous and unexpected occurrences include factors such as commissions and omissions by architects, liability on employers as well as force majeure insurance against losses delays caused by human error or intent.

A study by Ewusi-Mensah & Przasnyski (1991) revealed that most projects are shelved during the implementation stage, indicating a disconnect between planning and execution of the objectives of the plan. Numerous failures are attached to the inability of managers to appreciate the risks associated with the project. The expensive nature of insurance contributes to the perception that it is an optional component of project finance, (Slivker 2011). However, in reality, it remains an obligatory aspect of success in any project, owing to the fact that it is the only protection for the various forms of risks. Mitigation of risk is in some instances a pre-requisite by other parties to the project finance, including lenders, sponsors, contractors, government/public agencies, among others. Insurance covers normally cover some types of risks, considered as the most prominent forms of risk, classified depending on phases.

3.2.1 THE CONSTRUCTION PHASE

The start of this phase is indicated by the commencement of site preparation as well as mobilization of the required experts and parties for the implementation of the project, (Hoffman 2008). The construction phase is also characterized by acquisition of the necessary capital and human resources necessary for completion of the project, thereby making it possible for the parties to achieve completion of the work according to the pre-arranged work schedule. At this point in time, the project is most vulnerable, with

risk aspects related to “completion and development risk aspects, planning and grounding risks, off-take and purchase agreement risks as well as technology risks among others”. Most of these risks are insurable, thereby offering the project company an opportunity for risk mitigation. During this phase, Ruster (1996) projected that the approaches towards risk mitigation include “contractual agreements and associated guarantees, contingency funds and lines of credit as well as private insurance”.

POSSIBLE RISKS AND COVERAGE DURING THE CONSTRUCTION PERIOD

Instrument	Cost overruns	Delays	Start-up and testing problems	Contractor payment defaults	Hidden defects	Force majeure
Liquidated damages	X	X	X			
Performance bonds				X		
Retainage accounts				X		
Warranties					X	
Contingency funds	X	X	X	X		X
Insurance		X				X

Note: Table shows principal applications of instruments.

Figure 2: Risks during Construction period

3.2.2 CONSTRUCTION/ERECTION ALL RISKS

Physical losses and destruction of implements and other substances, fixtures and fittings and any other structures put up to contribute to the completion of the project. Enthoven et al (2010) postulated that all these elements play a role in the erection, production, fixing or completion of the infrastructure of the project, thereby accentuating their importance in the project as a whole. Insurance covers are in essence acquired in the name of the active stakeholders, with accidents caused by insured perils. Ultimately, risks assumed by other contractors, including EPC contractors are not necessarily covered by

insurance policies, unless expressly stated. For convenience in determination of the risk aspects to be handled during the construction period, this period is divided into: the erection period, commissioning phase and the maintenance and manufacturing liability phase.

As outlined by Dewar (2011), the rationale for this categorization is the fact that lenders and financiers attach different risk premiums to each phase as well as the difference in magnitudes of each phase to the outcome of the whole project. Accurate knowledge and appreciation of the various perils that face the project will also influence the ability of the parties to understand the possibility of qualification for claims in loss of revenue. Such claims are primarily categorized as on-site and off-site activities, with off-site activities not covered in the insurance policies. Such off-site elements are the responsibility of the manufacturers and suppliers, making it important for the project company to ensure compliance by these suppliers in order to assign liability to the right bases.

3.2.3 DELAYS IN COMMENCEMENT (DIC)

Martin & Marciano (2011) indicated that project finance relies on the collateralization of financing to the project cash-flows, thereby highlighting the aspects of the time value of money and impact of delays in actuation of revenue goals. The ability to generate revenues is a major fact in the acquisition of funds, owing to the stringent process of due diligence of monitoring of progress for the whole project. In most cases, the release of subsequent batches of finances is dependent on the project progress, making it important for delays to be avoided and any factors that can contribute to those

delays mitigated through insurance. Except for force majeure occurrence which are the responsibility of the sponsor, the contractor is responsible for the risks associated with the delays in projects (Davis 2008).

DIC covers are designed to introduce expansive protection against any delays originating from perils which lead to delays with material impact on the whole project, thereby providing the affected parties the ability to realize the anticipated profits. In most instances, efforts to address the requirements with DIC coverage is done prior to the commencement of financing due to changes in the environmental factors in the financial markets, a factor that can lead to increase in the demand for enhancement of the credit terms.

3.2.4 FORCE MAJEURE

According to Yescombe (2002), "Force Majeure – A natural or political event that affects the ability of one party to fulfill its contract, but that is not the fault of, and could not reasonably have been foreseen by that party." In project finance, Sorge (2004) observed that vulnerability to force majeure forms a distinguishing factor between corporate financed and project financed assets. The source of variation is the reliance on a single source of funds, thereby eliminating the ability to cushion losses in project finance. Lenders are keen on acquisition of policies for coverage against political uncertainty and acts of nature, for projects which are classified as the highest in terms of riskiness. Ahmed et al (1999) insisted that the level of risk can also depend on the possibility of restitution after the effects of forces majeure, with processing plants being the most complicated to restitute. In reality, insurance companies are keen on ensuring

that forces majeure insurance is laced with numerous risk premium elements owing to the fact that the extent of damage cannot be easily measured, regardless of the fact that restitution of such projects is sometimes possible. What it boils down to is the ability of the Project Company and contractors to prove to the insurer that sufficient procedures and guarantees are in place to reduce the impact of force majeure on the outcome of the project, such as measures to ensure fires do not spread to the whole of the project making it manageable to compensate such losses.

3.2.5 PERFORMANCE/DESIGN RISKS

Buljevich & Park (1999) proposed that coverage for design and performance is highly dependent on the wordings of the policy. It is imperative for the parties to be well-versed with the implication of the choice of words and phrases, in order to ensure that these do not influence the qualification for claims incase the consequences of occurrences necessitate that. Design coverage clauses determine the eligibility for compensation for losses arising from defects in designs, inputs and other implements, with there being two standard industry wordings currently in use. The standard wordings are basically hinged on whether damage will be based on direct or indirect effects of the losses incurred. Under performance risks, the main concern to the project company includes political risk, which is a prime aspect of both private and multi-lateral insurers. Main features of coverage under political risk are indicated in the following schedule, categorized under asset-based and trade-related risks:

Asset based Risks	Trade based Risks
Expropriation of the project by the State - Nationalization	Currency Convertibility and Transfer
Forced Divesture	Exchange Transfer Risk
Arbitration award default	Unfair / Wrongful calling of guarantee
Import/Export license embargo	
War and Political violence	

The Dabhol Project accentuated the aspects of political risk as indicated by Hoffman (2008). Completed in 1995, the project was overseen by multinationals including Enron, and General Electric. The power projects to be developed were placed under the management of Dabhol Power Company, in India; financing was sourced from entities associated with the Congress party, with state elections due and the political dominance shifting to Bhartiya Janata Party (BJP), which was opposed to the project. Ultimately, BJP ceased the financing to the project, leading to renegotiation of the power purchase agreement. Political risk compounds other forms of risk, owing to the fact it is a recurrent factor due to the periodic changes in the political outlook in every economy.

3.4 Insurance and the Operational Phase of the Project

In accordance with assertions of Allen & Razavi (2006) the operation phase is characterized by de-mobilization of all contractors and the entry of the operators for running of the project or facility. Financing for construction has already come to an end,

with design and performance specification having been assured. The fact that the completion tests have been done implies that handing over of the ownership of the project from the EPC contractor to the project company can take place. At that point, insurance policies are terminated giving way for coverage related to operational covers to stand in place. Similarly, guarantees for completion by the sponsors become invalid, limiting the extent of recourse to any form of risk. Coverage during this period can be defined as 'property all risk', insurance against physical damage to the project during operation. In addition to third party liability and machine breakdown, interruption of business as well as failure to achieve performance levels.

In project finance, insurance covers are not limited to transfer of risk but can also provide a source of finances. Through private placement of debts associated with projects, thereby generating finances through direct and indirect channels, although such arrangements are concentrated in limited markets (Buljevich & Park 1999). This form of finance is only limited to organizations with certain degrees of creditworthiness, thereby making it highly exclusive. The attractiveness of a project can also enhance the ability of a project to attract additional financing, through the use of monocline swaps. This exists due to the fact that insured bonds, normally classified as 'AAA' instruments are more affordable than those which are insured in terms of cost. Secondly, since these bonds have to be insured before they are sold, the project is able to raise funds, and expand the options for structured project finance especially in new markets.

POSSIBLE RISKS AND COVERAGE DURING THE OPERATING PERIOD

Instrument	Operating efficiency problems	Increase in routine O&M	Increase in major O&M	Market demand and pricing	Input availability	Force majeure
Take-or-pay				X		
Put-or-pay					X	
Pass-through		X		X		X
Debt service reserve funds	X		X		X	X
Maintenance reserves			X			
Cash traps	X	X		X		
Insurance						X
Tracking accounts				X		
Equity kickers				X		

Note: Table shows principal applications of instruments.

Figure 3: Risks during the Operating period

3.5 Conclusion

Insurance covers do not normally suffice in terms of lost cash-flows and enhancement in the expense associated with unforeseen requirements. As a result, in addition to insuring the insurable risks, efforts have to be undertaken to prevent their occurrence and the occurrence of other risks which cannot be insured. Insurance for project lending has not developed sufficiently, making it necessary for project companies to rely on aspects of asset-based lending and physical damage when choosing insurances. This is because restitutions cannot be comprehensive and insurance should only be used in instances where skill and care could not appropriately prevent the situation. Delays in time arising due to gaps between timing for lodging and payment of claims as well as the interruption of the project progress inculcate indirect costs in the project. Consequently, all parties ought to appreciate the fact that sound risk management efforts in the identification, evaluation and reduction of the impact of the perils is irreplaceable.

Ultimately, risk provides a basis for reduction and management of risks, thereby contributing to restitution of the insured/project company from any covered risks. It is imperative to ensure comprehensive coverage of all conceivable perils, making it possible for the progress of the project to be assured. In spite of the associated costs, the opportunity cost of lack of insurance is more than the expenditure on insurance. Insurance forms part of the requirements for financing by some lenders. The nature of project finance affirms this situation, since the success of the project is the only leverage against the debt owed by the project finance.

CHAPTER 4: PROJECT EXECUTION AND MANAGEMENT

Project execution is directed towards ensuring that the products and services for which the project was instituted are developed, (Delmon 2005). As a step occurring after the commissioning of the project, project execution and management represents the longest phase of the execution of a project, during which resource utilization is highlighted. The activities implemented during the project execution phase are a culmination of all the plans, timetables, processes and models developed earlier in the life of project. Unanticipated events are also provided for as contingencies, thereby necessitating paradigms to handle them accordingly. Ultimately, the production of acceptable and tested products marks the success of the phase, paving way for transitioning to project closeout.

The project exaction phase involves numerous changes in the roles and responsibilities of the individuals including managers (Groobey et al. 2010). The change is from observation and planning to action and participation which entails execution of the project with the sole aim of developing baselines and achieving the initial targets, in order to ensure that the outcome of the project is hinged on success. Projects are currently dependent on their ability to align plans and objectives with utilization of information technology as a way of improving risk management and control (Maguire 2011). Managing information flows is an essential aspect of risk management and mitigation. Component elements and processes in this phase include the following.

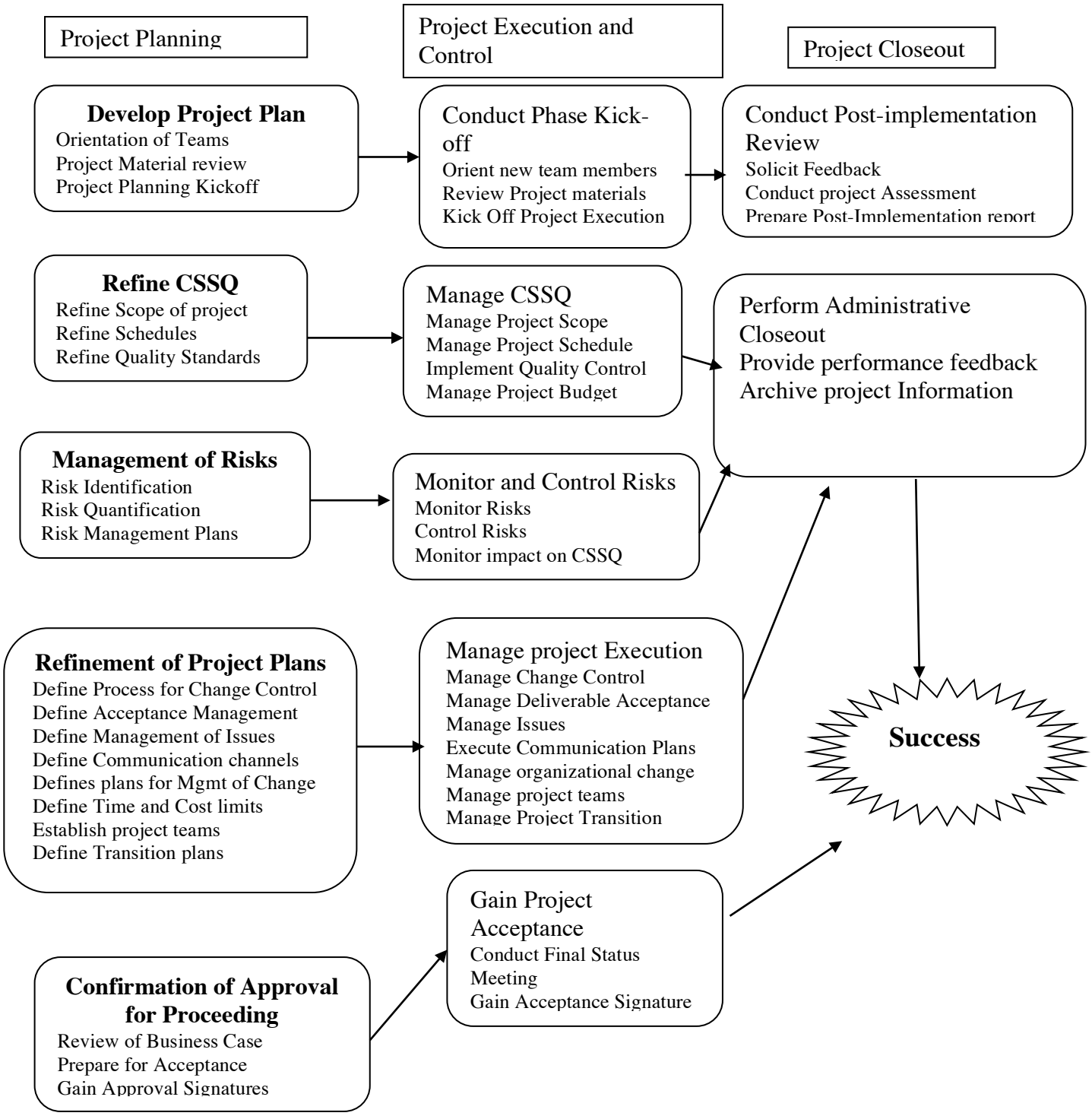
4.1 Project Execution and Commencement

The project manager holds a meeting with the relevant individuals, most of who are part of the execution team in order to spell out the formal start of execution and management phase (Finnerty 2011). During this meeting, project controls and frontiers are spelt out, as part of the necessary steps towards achievement of the anticipated goals and objectives. Similarly, new members are oriented into the procedures and norms put in place to commensurate the expectations of the project managers. Finally, documentation of the status quo of the project is done in order to provide a basis for measurement of performance after the end of the period for review, as indicated in figure 2 below.

4.1.1 Management of Cost-Scope-Schedule-Quality (CSSQ)

Project managers are mandated to implement programs and schemes to ensure that the project remains even under the influence of changing environmental factors. Risks associated with achievement of performance standards are major aspects of the outcome of the project, making it necessary for hands-on management of the operations and procedures of the company. Ultimately, management of project scopes and schedules stands out as a demanding role, requiring the input of a responsible individual who have executive power to implement changes as and when needed. Groobey et al. (2010) suggested that processes associated with control and assurance of quality of products and services on offer as established in the project budget are also handled under CSSQ, making it possible for the goods and services to meet the expectations of consumers and other stakeholders, primarily statutory standards.

Figure 4: Project Life cycle components



4.1.2 Monitoring and Mitigation of Risks

Project finance relies on the elimination of risks and mitigation at any point in time. In essence, the successful financing, development and implementation of the project is hinged on the reduction and elimination risks, making it necessary for project managers to have intricate and comprehensive risk management plans for every phase of the project (Ahmed et al 1999). Novel responses and declarations are required to handle new risk aspects whose eventualities were unplanned for, with such instances limited to rare events. Risk monitoring and mitigation is an organization wide responsibility, with each of the team members playing a contributing role in the outcome.

4.1.3 Management of the Execution Process

Projects developed under project finance are executed by teams and individuals from various backgrounds, each with a specific interest and role, (Ewusi-Mensah & Przasnyski 1991). However, the outcome of the project is the responsibility of the project manager who has to ensure that efficiency and effectiveness of the production process is maintained at agreeable levels. Correct performance of the duties associated with the project is the duty of the manager owing to his executive power and access to the owners of the project. Ultimately, it is his responsibility to ensure that each resource utilized is directed towards generation of revenues.

Project deliverables is the outcome of successful completion, testing and production of the specific goods and services (Taylor 2009). As a result, the transitioning from a cost center to a revenue-generation entity culminates in the acceptance of the

products and services on offer, thereby transitioning the project to a performing aspect of the economy or locations where it is developed.

4.2 Stakeholders to a Project

According to Maguire (2011), each project is subject to the influence of a number of stakeholders, most of who have vested interests. The influence of these stakeholder categories can either be direct or indirect, periodic or perpetual, making it necessary for the project company to appreciate the nature of the relationship at the earliest opportunity so as to avoid misconceptions. Each of the shareholders, being rational, is in search for value creation, an aspect which demands the utilization of resources. It is the duty of the project manager to appreciate the expectation of each category of stakeholders in order to ensure that their input contributes to the improvement of the organization, so as to warrant the output and value they draw from the company.

The diverse nature of project finance influences the ability of project companies to limit the stakeholder categories to a specific catalog. However, most projects will have converging arrays of stakeholders, most of which have similar interests and responsibilities. A study by Vences (2006) on the Camisea Gas Project in Peru revealed numerous insights with regard to the interrelationships between stakeholders. Although the project had five major stakeholder groups, these categories were populated with 26 different stakeholders implying that there existed different interfaces of the stakeholders. Taking into consideration that each of the 26 categories were comprised of other sub-groupings, the result is over 1125 trillion possible interactions, thereby complicating the

outcome and decision making process due to the varied interests of each group. Most projects are marred with conflicts on their ability to create value and improve the situation of the communities in the environment as well as protecting the environment to absolute levels.

4.2.1 THE SPONSORS

Project sponsors are entities entitled to coordinate the development of the overall project, and could act individually or severally, (Ahmed et al 1999). The project sponsors normally appoint the project company and avail the necessary assets and resources for the completion of the project. The objectives of project sponsors have to be aligned with the financing model selected in order to ensure that the completion of the project is not jeopardized. Sponsors are protected from liability through the use of non-recourse finance as well as other covenants in the financing agreements, in order to establish their limited liability status (Ewusi-Mensah & Przasnyski 1991). Project sponsors are keen on devising and implementing approaches to reduction in the cost and expense levels in order to ensure that the completion of the project with the least possible amount of finance. The identification of tax benefits, flexible future funding as well refinancing arrangements are some of the responsibilities of sponsors who are best placed to make such decisions and commitments for the project.

Project sponsors spent numerous months and sometimes years expending planning expenses as well as establishing the most viable approach to completion of the project. According to Hoffman (2008), the various objectives that a project sponsor is

interested in include “limiting further development costs, minimizing transaction costs, recovering development stage expenses and earning construction management or similar fees to fund overhead costs”. Consequently, it is imperative for them to ensure commencement of the project at the earliest opportunity in order to ensure that benefits start to accrue at the earliest opportunity.

4.2.2 TECHNICAL ADVISORY BOARD

This category of stakeholders provides advice and insights to the lenders and sponsors regarding technical aspects of projects (AlHawari 2011). Their intricate knowledge of the nature of the project in which the company is involved, places them at an advantage thereby creating the need for their involvement. Consequently, various advisors play a role in the preparation of reports regarding feasibility, progress, performance as well as other necessary elements to as outlined in the contracts with the aim of availing information about the project at any point in time. These advisor reports play a major intermediary role in the relationship between the lenders and sponsors, owing to the independence enjoyed by the advisors.

4.2.3 THE SUPPLIERS

According to Hoffman (2008) suppliers provide the necessary inputs and raw materials for commencement and continuance of production. Timely delivery of accurate quantities and qualities of raw materials accords operators the ability to achieve production standards. As a result, it is necessary for suppliers to ensure timely deliveries at predictable prices and quantities in order to eliminate the levels of uncertainties. For

some projects, dedicated suppliers are required, culminating in the development of contracts for commitment to supply.

4.2.4 The End Consumers

Just like the company expected reliable supply of inputs, end-consumers expect predictability in prices, availability of outputs as well as quality of the goods and services to be produced. In most instances, Hoffman (2008) indicates that consumers are at a disadvantage with regard to the aspect of buyer power, since the project enjoys monopolies in most aspects.

4.2.6 The Lenders / Financiers

Lending banks and other financiers are prime stakeholders of the project. In most instances, project finance is hinged primarily on the ability to raise finances collateralized on the projected revenue. As a result, the financiers should be willing to provide sufficient and contingent capital in order to see the project through and avoid failure after commencement since the opportunity and direct costs will be immense. The fact that the funds provided are non-recourse implies that the interests of the lenders go beyond just bank-rolling the project. Ewusi-Mensah & Przasnyski (1991) proposed that due diligence has to be extensive with risk reports indicating any uncertainties in the project plans are a major concern for stakeholder. Ultimately, the nature of project finance with relationship to its riskiness plays a role in the care and skill put in ensuring the success of the project, making it the responsibility of all those affected, (Ahmed et al 1999). Lenders exercise a certain form of control on the success of the project, by closely monitoring the progress.

Completion guarantees and cost schedules form part of the reports required from the administrators of the project. Financial analysis of the project remains an ongoing aspect of project finance.

Large projects are normally financed by syndicates, with the funds treated in separate records in order to meet capitalization requirements as well as avoid the concentration of risks originating from the nature of the financing. Syndicated lending enables project companies to source funds from domestic and international financiers, thereby achieving the necessary level of diversity to avoid expropriate by the host government. In project finance, lenders are categorized either as the arranger, the managers, the facility agent, the technical bank, account bank, insurance bank, and the security trustees.

Lenders are keen on margins to cover the cost of risks and other costs related to financing the venture. Unlike shareholders, lenders are only entitled to the principal and accrued interest regardless of the success of the project in revenue generation, as observed by Vinter & Price (2006). Consequently, their aims include generation of profits from financing, assuming control over major decisions regarding the project, assuming quantifiable risks only, providing back-up finance incase of hardships during the phases, as well as performing any other technical and advisory role to ensure the success of the project. Other forms of lenders not under the category of banks may have affiliate objectives, such as promoting international culture, and creation of a market for their products, objectives which are not necessarily driven by profitability.

4.2.6 THE CONTRACTORS

Contractors are stakeholders on account of their professional knowledge/skill in oversight and development of infrastructure. Contractors are also knowledgeable on the intrinsic aspects of the project being implemented, thereby enhancing their ability to contribute to the implementation of the project. Their ability to identify and mitigate risk aspects places them among stakeholder groups who are key to the success of the endeavor.

4.2.7 THE GOVERNMENT/PUBLIC INSTITUTION

Hoffman (2008) postulated that the government/public entity closely associated with the products and services it offers is normally a stakeholder in that it has to offer the social license to operate (SLO). According to Lynch (n.d.), the SLO is a model "addressing the demands and expectations that emerge from neighborhoods, environmental groups, community members and other elements of the surrounding civil society". Ultimately, the society is protected by the SLO from any activity that is instrumental to outcomes that are unacceptable.

Ultimately, the perception and attitude of the host government will be aligned with their expectation of the value-creation capacity of the project. Either the project entails creation of a source of revenue, or an avenue through cost-cutting efforts for the benefit of the citizens. As a result, most projects completed in the interest of the government entail agreements for Build-Own-Transfer (BOT), in order to ensure that the public benefits from the outcome of the project.

According to Ahmed et al (1999), “the surge in utilization of project finance in developing country occurred soon after the Asian crisis, propagating the entry of global finance in the Asian economy as well as the dramatic recovery from the downturn. Global interest in project finance has risen to prominent in the past two decades, by structuring financing for projects around non-recourse sources of finance.” As a consequence of the ability of project finance to inculcate integrity and transparency in the development of necessary infrastructure, it has continuously offered a paradigm through which parties to a project offer the investors an opportunity to share risks, costs and gains associated with risky ventures. As observed by Fight (2006) project finance is hinged on the use of non-recourse or limited recourse finding. By combining equity and debt, capital-intensive industries are developed.

CHAPTER 5: CASE STUDY OF A CSP PROJECT IMPLEMENTING PROJECT FINANCE MODEL

5.1 Introduction

Concentric solar power (CSP) utilize solar energy to generate heat and power through concentration of solar energy for the operation of steam turbines. A CSP plant system consists of the power block with the solar collector array, a heat-collecting element and the heat transfer fluid as the transfer medium. The power cycle is the variation of the Rankine cycle used for steam generation and driving the steam turbine. Auxiliary component typical for solar power plants is the thermal storage offered to store energy generated during the day and an auxiliary boiler to meet the peak utility demand.

CSP projects utilize less land as compared to hydroelectric power plants thereby producing more energy per acre used. Also no land preparation is required for these projects and the fact that deserts are usually barren with very little habitation and provide maximum exposure to sun making the selection of the site and the sustainability of such projects in the long run.

CSP projects are economically viable to run and maintain. Unlike other forms of power plants, solar energy requires limited overheads to maintain enhancing its utility for project finance. Site preparation entails evening of the ground where mirrors are to be installed for maximum exposure to sunlight. Once installed, design risks is associated with depreciation in the quality of mirrors. However, mirrors have to be cleaned in order to enhance their reflective capacity, implying a minor overhead.

Solar plants are neutral with regard to landscape except for the raised structures and piping, most of which stick above ground. As a result, they do not influence the topography of a region as compared to nuclear and coal power plants. The noise pollution arising from such plants is minimal, considering that the noisiest component is the turbine. The minimal usage of engines as opposed to other forms of energy promotes the ability of such plants to co-exist with other ecological habitats without any negative influence on the ecosystems. CSP is also a green project, owing to the fact that it does not entail emission of green-house gases into the atmosphere. As part of the green revolution, the operations of the CSP are preferred to other forms of energy owing to the fact that users contribute to protection of the environment.

Overheating or overcooling of the thermal fluid compromises the efficiency of the solar power generated. The thermal liquid has to be maintained at safe temperatures in order to ensure that generation of solar energy is achieved right from the time that the sun rises. As a result, automated aspects of the System Advisor Model[1] (SAM) model generate commands for the release of back up heating mechanisms when temperatures drop below certain levels, thereby maintaining the thermal fluid at optimal temperatures. Thus the temperatures are maintained within the design conditions, and the costs associated with this mechanism are negligible in the long run, and accounted for as parasitic costs.

[1] SAM is a solar power plant modeling tool developed by National Renewable Energy Laboratories (NREL)

CSP solar projects are subject to fluctuations over their lifetime as opposed to other sources of energy. Ultimately, the productivity of the project is the main casualty, owing to the transient aspects, imposing a huge toll on the performance of the plant. As a result, production expectations and standards are based on averages and measures of central tendency as opposed to accounting for the transient nature of the productivity. The SAM model utilizes discretized models for the homogeneous sections of the surface, which has a significant impact on the loop temperatures. CSP projects rely on simulations based on hourly weather conditions, thereby influencing the distribution and applicability of the assumptions utilized. By calculating the transient heat, the difference between the hot and cold components of the system, the SAM is able to estimate the availability of energy for the specific period being measured, be it daily or hourly.

The design of the project has ensured that there is limited loss of latent heat, thereby ensuring maximum generation of energy and revenues. The sizing of the components of the plant viz. generator and piping systems complement the length of exposure to solar, thereby maximizing usage of space and available resources while maintaining development costs at the lowest minimum. The size of the individual piping is related to the volumetric flow rate, culminating in value creation for users of the system.

The efficiency of CSP plants depends on the availability of sun exposure for extended periods, capacity of storage units, and other auxiliary conditions that affect the plant. The performance of the plant exists in the post-design aspects, although most of the

designs are adjusted to optimize the production under the specific conditions for the location of the project.

5.2 Financing structures for Concentric Solar Projects

Concentric solar projects are versatile projects which can be fragmented in order to serve the needs of the isolated individuals or located in centralized locations for generation of power that is transmitted to the final destination. The dynamic nature of CSP makes it possible for public institutions intending to utilize solar energy to achieve results regardless of the limitations on resources and expertise.

Financing for such project is a major aspect towards success of the project. Just like other projects financed under non-recourse debt, CSPs offer the financiers and project companies the ability to provide social amenities and public goods with the revenues from these goods and services acting as security. More often than not, public institutions who oversee the project have power purchase agreements, which are effectively modeled out of the aspects of the project. Centralized projects are easier to fund, since the management and implementation of the project takes place under the guidance of a specific entity, which is charged with the duty of appraising the project and ensuring its successful completion and oversight.

Decentralized projects have also played a major role in achieving the government policy of availing power and sustainable renewable energy sources to its citizens. In some economies, such CSP projects are subsidized by the government, thereby enabling the

home owners and construction contractors to afford the necessary inputs, which are later included in the costs of developing the real estate.

Power purchase agreements, which are the basic source of revenues for the projects can either be structures to compensate for the total production per household. Set-off agreements entail payment for the units supplied to the national grid, which implies that domestic consumption costs are not accounted for. As a result, the state compensates the owners of the project by purchasing power into the national grid, while the households get subsidized supply of power from the project generation.

The other form of power purchasing agreements entails the production of power to the power grid, and subsequent purchase of power from the national grid. Cash flows from the models forming the most prominent source of collateral are measured depending on timing, either as immediate or delayed. The time value of money principles account for the discounting of the cash flows across the period, through annualized discount rates, with these revenues adjusted for inflation and other expense, assuming constant inflation over the period of the project life time. The use of indices calibrated to a specific base year allows for inclusion of the inflation through use of real dollars as opposed to nominal values. Time adjusted estimates for the inflation are more real as opposed to the normal measures, considering that changes in the economic outlook of an economy is bound to influence the real value of money in various ways across the period.

Results in the investment analysis can be grouped depending on the financing, useful life and depreciation life of the project. These periods are relevant to the project, with time horizons influencing the utility of finance and independence of the project

company. Discount rates play a role in the inculcation of the time value of money, and estimation of the present value of money. Present values are important aspects of the viability of project, since the cash flows have to exceed the initial costs, with both aspects adjusted to time differences. The use of present value of money, with provisions for inflation and other changes in the economic conditions enhances the ability of the project to adjust risks associated with future cash flows. Financiers are able to remain assured of the viability of the process from the first step to the last.

In most cases, the discount rates are based on the long term Treasury bond rates, which are reliable and probable measure of the current economic conditions. These rate of return are deemed sufficient and prudent for use, and can even be applied by the private sector, primarily due to the fact that they are long term in nature and are issued for similar purposes to project finance. Financiers can also utilize the discounted cost of capital in setting discount rates, especially in cases where the bond rates are not sufficient. Cost of capital rates are able to address the intrinsic aspects of the cost impressions, thereby ensuring that viability of the product is assured. When cost of capital is used, the overall discount rate depends on the weighted average cost of capital (WACC), as a way of including the aspects of other sources of capital, including equity and the various debt components classified according to the original costs. The WACC will present the most prudent basis for establishing standards for the project cash flow analysis, including adjustments for taxation.

Taxes are an important aspect of the analysis of viability of project. Just like other cash flows, taxes ought to be adjusted to real terms. Federal and state taxes applicable

should all be included, with the inclusion of tax credits, especially owing to the existence of subsidies by governments. Location of projects can also be adjusted in order to take advantage of tax credits, most of which vary from state to state. The financial incentives associated with these tax credits cannot be underestimated however low.

Revenues from concentric solar projects are major components of the financing decisions of the project. Fixed charge rates for the energy products are the most applied models, with customers footing the bill, either directly or through offsets and subsidies from the government. The fixed charge can either be estimated before or after tax, thereby indicating the impact of taxation which forms a basis for decision making by the stakeholders of the project. Fixed charge rates can also be expressed either in nominal terms or real terms, with the outcome being clarity in the outcome of the project.

Financing aspects of concentric projects are more preferable than other project finance aspect. Concentric solar projects have reliable sources of revenue since energy sources are always required. The demand for energy in any economy is reliable across the year, with long term bonds and debentures forming a major component of the financing. Debt financing is preferred owing to the tax deductible aspects of the financing structure. Equity sources of debt do not incur any form of fixed charges, with components such as preferred stock exuding different tax and return requirements.

CONCLUSION

CSP projects are faced with numerous risks. These risks are associated with revenue generation and productivity, especially with regard to the unavailability of information. Uncertainty analysis exists as a way of ensuring that the base line production and revenue levels are measured against the projections. Probability distributions are determined as a four-step process, including determination of the economic measure, estimation of the suitable parameters, assessment of the aspects of each parameter as well as determination of probability of the overall project. Economic measures including internal rate of return (IRR) and total life cycle cost (TLCC) of project are the most used parameters. Monte Carlo simulations are sometimes utilized in order to ensure that the probability distributions and the outcome of the process.

The viability of the project depends on the positive net present value, indicating that the profitability of the project is assured. Project can either be accepted or rejected, or ranked depending on their viability thereby ensuring the stakeholders to decide upon the most viable option. In some cases, the highest rank project which is ultimately selected does not represent a positive net present value, but due to the benefits, it is the preferred choice. Whether the NPV, IRR, Total Life Cycle Cost, Levelized Cost of Energy or the annualized value is used, the selection criteria should result to identification of the most viable projects.

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